AMENDMENTS TO THE CLAIMS

1. (Original) An image sensor comprising:

a plurality of image sensing pixel portions; and

a plurality of image processing portions;

each said image sensing pixel portion including a photoreceptor, which has a first sensitivity to light and produces charge based on an amount of incident light, and an associated portion for said photoreceptor, which associated portion selectively receives charge from said photoreceptor but which by itself has a second sensitivity to light different than said first sensitivity to light and produces charge based on an amount of incident light, an in-pixel follower transistor, and an in-pixel select transistor; and

wherein each said image processing portion includes circuitry that produces an output indicative of both an amount of charge received by said associated portion, and an amount of charge received by said photoreceptor.

2. (Original) A sensor as in claim 1 wherein said photoreceptor is a photogate, and said associated portion is a floating diffusion associated with said photogate in each said pixel.

3. (Original) A sensor as in claim 2 further comprising a transfer gate, located between said photogate and said floating diffusion, which separates charge stored in said photogate from said floating diffusion.

4. (Original) A sensor as in claim 2 further comprising, in each said pixel, a reset transistor, connected between a reset level and said floating diffusion, and which operates to reset a value of said floating diffusion to a specified level.

5. (Original) A sensor as in claim 2 wherein each of said photogate, said floating diffusion, and said in-pixel transistors are formed of MOS-type technology.

6. (Original) A sensor as in claim 2 wherein said image processing portion includes a plurality of sample and hold circuits.

7. (Original) A sensor as in claim 6 wherein said plurality of sample and hold circuits include a first sample and hold circuit storing a reset level, a second sample and hold circuit storing a photogate level, and a third sample and hold circuit storing a floating diffusion level.

8. (Original) A sensor as in claim 7 further comprising a circuit which outputs a first, low sensitivity output indicative of a difference between said floating diffusion level and said reset level and a second, high sensitivity output indicative of a difference between said photogate level and said reset level.

9. (Original) A sensor as in claim 2 further comprising a controlling circuit, operating to control times of integration of said photogate and said floating diffusion, such that said floating diffusion integrates for a same time or less time than an integration time of said photogate, and such that at least part of the time of integration of said floating diffusion overlaps a time of integration of said photogate.

10. (Original) A sensor as in claim 2 wherein there are a plurality of said image processing circuits, each of which are substantially identical, each image processing circuit associated with an entire column of pixels.

11. (Original) A sensor as in claim 10 further comprising a control circuit, which produces a row select signal to each of a plurality of pixels in a single row, to provide outputs from said each of said plurality of pixels to an individual image processing circuit.

12. (Canceled).

13. (Currently amended) ~~A method as in claim 12~~ A method of imaging, comprising:

imaging a scene by simultaneously obtaining both a high sensitivity signal and a low sensitivity signal in each of a plurality of pixels of an image sensing device, using an integration period which is at least 80% overlapping for both high sensitivity signal and a low sensitivity signal, both said high sensitivity and low sensitivity signals being obtained within the pixel itself;

wherein said obtaining comprises providing both a photosensor and an associated device that is associated with said photosensor which normally obtains charge from said photosensor, said photosensor obtaining the high sensitivity signal and said associated device obtaining the low sensitivity signal; and

outputting both of said high sensitivity signal and low sensitivity signal.

14. (Original) A method as in claim 13 wherein said photosensor is a photogate and said associated device is a floating diffusion which receives charge from said photogate.

15. (Original) A method as in claim 14 further comprising:

obtaining a signal by determining a reset level of the floating diffusion;

determining an integrated value indicating the level of the floating diffusion, obtained by integrating a scene for a first specified time;

obtaining a second integrated level, obtained by integrating the scene in said photogate for a second specified time; and

outputting differences between said reset, photogate, and floating diffusion levels.

16. (Original) A method as in claim 15 wherein said first integration time of said floating diffusion is less than or equal to said second integration time of said photogate.

17. (Original) A method as in claim 15 wherein said obtaining and determining comprises first sampling said reset level, then sampling said floating diffusion level, and then transferring a photogate level to said floating diffusion level and sampling said floating diffusion level again to obtain a photogate level.

18. (Currently amended) A photosensor device comprising:

a single continuous substrate of semiconductor material;

an image sensor portion, formed on said substrate of semiconductor material, said image sensor portion including an array of image sensor pixels, including

photoreceptors, arranged in rows and columns, each of said pixels formed of an MOS electric component;

an image processing portion, also formed on said substrate, and connected to said image sensor portion such that each pixel can be selectively coupled to a specified portion of said image processing portion, said image processing portion including a plurality of transistors, each of which are formed of MOS transistors, and a plurality of which of formed of CMOS transistors, wherein said image processing portion includes a plurality of sample and hold circuits therein, including a reset sample and hold which samples a reset level, associated device sample and hold circuit which samples the level of said associated device, and a photoreceptor sample and hold which samples a level of said photoreceptor; and

a control portion, controlling integration of photoreceptors in said image sensor portion including times of said integrations, and also controlling connections between said image sensor and said image processing portion, and controlling timing of operations in said image processing portion,

each of said pixels and said image sensor including a photoreceptor, a transfer gate, and an associated portion that selectively receives charge from said photoreceptor via said transfer gate, a reset transistor, a follower transistor, coupled to said associated portion, and operating to buffer the value of said associated portion, and a selection transistor, coupled to said control portion, said control portion controlling said selection transistor to produce an output from the specified pixel such that a level of the associated portion is first sensed, and then values are coupled from said photoreceptor into said floating diffusion and to sample values on said floating diffusion, said values provided to said image processing portion.

19. (Canceled).

20. (Currently amended) A device as in claim [[19]] 18 further comprising a subtraction element which subtracts said ~~reset~~ associated level from said ~~associated~~ reset level to produce the low sensitivity signal and subtracts at least one other level from said photoreceptor signal to produce a high sensitivity signal.

21. (Original) A device as in claim [[19]] 18 wherein said photoreceptor includes a photogate and said associated device includes a floating diffusion associated with said photogate.

22. (Original) A device as in claim 21 wherein said image processing portion includes a plurality of sample and hold circuits, a first sample and hold circuit sampling a reset level, a floating diffusion sample and hold circuit sampling a level in the floating diffusion prior to transfer of photogate charge thereto and a photogate sample and hold circuit sampling a level on the floating diffusion after transfer of photogate charge thereto.

23. (Original) A device as in claim 22 wherein said sample and hold circuits are controlled by said control portion.

24. (Currently amended) A device as in claim 18 wherein said image processing portion includes a plurality of image processing circuits, arranged such that one image processing circuit is associated with an entire column of said image sensor pixels, and said control circuit controls said image sensor pixels to select an entire row of image sensor pixels at one time, said entire selected row being coupled simultaneously to

different ones of said image processing circuits to determine values therefrom to thereby operate to output an entire ~~column~~ row in parallel.

25. (Original) A device as in claim 18 further comprising a reset transistor in each of said pixels.

26. (Original) A device as in claim 21 wherein said control portion controls integration times of both said photogate and said floating diffusion by controlling the reset transistor to said floating diffusion to first reset said floating diffusion, then control said select transistor to sample the level on said floating diffusion.

27. (Original) A method of obtaining images of different sensitivities, comprising:

allowing integration to occur in a floating diffusion associated with a photogate;

first sampling a level of integration which has occurred in said floating diffusion and then transferring charge from said photogate to said floating diffusion and sampling the level that has occurred in said photogate; and

outputting two values indicative respectively of a low sensitivity signal and a high sensitivity signal that were integrated at substantially the same time, based on said floating diffusion signal and said photogate signal.

28. (Original) A method as in claim 27 wherein said low sensitivity signal corresponds to said floating diffusion signal subtracted from said reset signal.

29. (Original) A method as in claim 27 wherein said high sensitivity signal corresponds to said photogate signal subtracted from said floating diffusion signal.

30. (Original) A method as in claim 27 wherein said floating diffusion is 30-40 times less sensitive to light than said photogate.

31-32. (Canceled).